

Diesel Engine Fuels & Lubricants for Europe

Present Status & Perspectives

Motor Fuels: Energy Efficiency & Emissions in Transportation

A Joint Meeting:

US/DOE - CAFE - JCAP

Washington DC

9-10 October 2002



- Introduction
- Conventional Diesel Fuels
- Off-Road Diesel Fuels
- Renewable Diesel Fuels
- LCA study on alternative fuels
- Lubricants

Diesel	2000	2005
Cetane # (min)	51	on-going
Density _{15°C}	845	on-going
Distillation 95%	360°C	on-going
Polyaromatics	11% m/m	on-going
Sulphur ppm	350	50

Amendments to Directive 98/70/EC

Adopted 11th May 2001

- Introduction of ZERO sulfur Diesel fuels before **1st January 2005**
- Full market penetration of ZERO sulfur Diesel fuels by **1st January 2011**

Web <http://europa.eu.int/comm/environment/sulphur/index.htm>

Three key issues have arisen during the debate in the Council

- the final date after which the maximum sulphur content of all diesel fuel sold should be < 10 ppm (2011 deadline will be reconsidered in 2006)
- the possibility to have more stringent environmental specifications than those set down in the directive when they are justified by local environmental conditions (process acceleration in 'sensitive' areas)
- whether the quality of diesel used for road vehicles should be extended to apply in non-road mobile machinery applications

DG environment and the **JRC Emissions and Health Unit** are involved in the Task Force Fuel for non-road mobile machinery.

Target: prepare the next regulations regarding non-road fuel quality.

Challenges:

Identify the best technical/economical/environmental compromise regarding the sulfur content, according to various new engine technologies introduction (EGR, aftertreatment, durability problems with EGR if sulfur level too high)

Harmonize the fuel quality, distribution systems and duty/tax regimes among the member states (e.g. some of them allows to use heating fuel for non-road machinery, agriculture, etc.).

Present EU Regulations

Sulphur in Liquid Fuels Directive

- Sulfur Content < **2000** ppm by **1st January 2000**
- Sulfur Content < **1000** ppm by **1st January 2008**

- Practically, large disparities in the market.
- Non-road fuels are most commonly supplied as heating oil quality.
- Illustration:

Sweden supplies non-road applications (excluding ships, rail, stationary engines) with road diesel quality (10 ppm S max).

Denmark supplies non-road applications with heating fuel at 500 ppm S.

Preliminary points of discussion for further regulations

At the moment, 3 scenari are considered:

Scenario/Fuels	A	B	C
Road	Q1 + markers	Qmob + markers	Q with low sulfur
Non-road	Q2 + markers	Qmob + markers	Q with low sulfur
Heating	Q3 + markers	Qh	Q with low sulfur

- Scenario A: Sulfur content for non-road application between 350 and 500 ppm would be a good compromise (by blending on-road 50 ppm and Heating fuel 2000 ppm).

- In the cost estimation for application, costs for new distribution and storage infrastructure are important and will not be underestimated.

EU plans to achieve 20% substitution of diesel and gasoline by alternative fuels in road transport by 2020

“Directive Biofuel Proposal”

Biofuels appears to be the most promising solution in a short/medium term, as they are already available, and possibly blended. The two other candidates are Natural Gas and Hydrogen

Optimistic Development Scenario

Year	Biofuels %	Natural Gas %	Hydrogen %	Total %
2005	2			2
2010	6	2		8
2015	7	5	2	14
2020	8	10	5	23



Diesel + Gasoline

- The Commission proposal intends to assist the EU in achieving its 8% reduction in 1990 levels greenhouse gases emissions by 2010.
- Biofuels represent a short term alternative since they are 'technically available', indigenous and CO₂ neutral.

But they are **EXPENSIVE** and **LIMITED**

Life Cycle Analysis study applied to alternative fuels and propulsion solutions, in term of **CO₂ emissions reduction**

Collaboration **EUCAR/JRC/CONCAWE**

Timetable: March 2002 - March 2003

TARGET: Development and exploitation of a consensual predictive tool for alternative fuels life cycle assessment, focusing on **CO₂ emissions** (or GHGs more generally), and giving to some extend **Availability** and **Costs** indicators.

Resource

Crude oil

Coal

Natural gas

Land

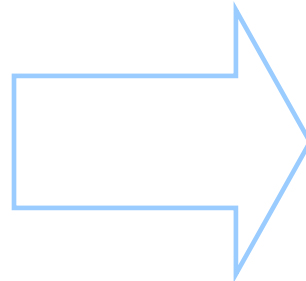
Wood

Sugar beet

Wheat

Oil seeds

Wind



Fuels

Conventional gasoline/diesel

Naphtha

Synthetic naphtha/diesel

CNG

Hydrogen (compressed / liquid)

Methanol

DME

Ethanol

FAME

Fuels

Conventional
gasoline/diesel

Naphtha

Synthetic naphtha/diesel

CNG

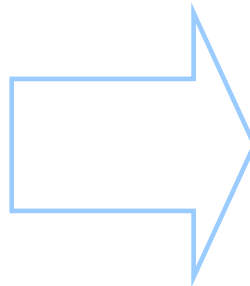
Hydrogen (compressed /
liquid)

Methanol

DME

Ethanol

FAME



Powertrains

Single vehicle platform: VW Golf

Conventional gasoline / CNG engine

Direct gasoline / diesel injection

Hybrid gasoline / diesel / CNG

Fuel cell (+ reformer)

Hybrid fuel cell

No direct EU regulation on the Lubricants formulation.

- Lubricants production plants are regulated for their emissions (like other chemical plants)
- Indirectly, car manufacturers are editing norms and specifications (ACEA, API) concerning the lubricants formulation (Chlorine, Phosphorus, Sulfur), helping to reach vehicle emission standards.
- The directive 91/692/EEC regulates the disposal of waste oil:
Collection + Treatment (processing/refining, storage above or under ground).

This point will be soon EU addressed,
on a life cycle basis,
including recycling aspects.